

WHAT IS CLAIMED IS:

1.           A fuel cell having at least one unit comprising a first separator in which a fuel gas passage section is formed, a first seal sheet which seals the first separator periphery, a fuel gas diffusion layer, an anode, a polymer electrolyte, a cathode, an oxidizing gas diffusion layer, a second seal sheet which seals a second separator periphery and second separator in which an oxidizing gas passage section is formed, in this order, wherein the fuel gas passage section and oxidizing gas passage section are in communication with the manifold in the first and second separator, respectively, a comb teeth structure is provided between the fuel gas passage section and manifold and another structure between the oxidizing gas passage section and manifold, slit spaces are formed between the comb teeth in such a way to be in communication with the diffusion layer, and the manifold in the first separator is in communication with the fuel gas passage section via the slit spaces and manifold in the second separator is in communication with the oxidizing gas passage section via the slit spaces.
2.           The fuel cell according to Claim 1, wherein the periphery around each of said first and second separator, on which said seal sheet is placed, is 1 mm thick or less.
3.           The fuel cell according to Claim 1, wherein

said comb teeth structure is positioned on the extension of the convexes in the gas passage section of each of said first and second separator.

4. The fuel cell according to Claim 1, wherein said slit spaces in said comb teeth are arranged at a pitch of 0.8 to 2.5 mm.

5. The fuel cell according to Claim 1, wherein thickness of said diffusion layer having said comb teeth structure is set at 0.2 to 0.4 mm.

6. The fuel cell according to Claim 1, wherein void fraction of said diffusion layer having said comb teeth structure is set at 50 to 90% when no load is applied.

7. The fuel cell according to Claim 1, wherein said comb teeth structure is formed on each of two sides of the diffusion layer facing each other.

8. A fuel cell having two or more stacked units each comprising a first separator in which a fuel gas passage section is formed, first seal sheet which seals the first separator periphery, fuel gas diffusion layer, membrane electrode assembly, second seal sheet which seals a second separator periphery and second separator in which an oxidizing gas diffusion layer and oxidizing gas passage section are formed, in this order, wherein the fuel gas passage section and oxidizing gas passage section are in communication with the manifold in the first and second separator, respectively, a comb teeth structure is provided between the fuel gas passage

section and manifold and another structure between the oxidizing gas passage section and manifold in such a way that each is attached at least one of the sides of the diffusion layer on the membrane electrode assembly to form a monolithic structure, slit spaces are formed between the comb teeth in such a way to connect the manifold to the fuel gas passage section and the other manifold to the oxidizing gas passage section.

9. The fuel cell according to Claim 8, wherein the periphery around each of said first and second separator, on which said seal sheet is placed, is 1 mm thick or less.

10. The fuel cell according to Claim 8, wherein said comb teeth structure is positioned on the extension of the convexes in the gas passage section of each of said first and second separator.

11. The fuel cell according to Claim 8, wherein said slit spaces in said comb teeth are arranged at a pitch of 0.8 to 2.5 mm.

12. A separator structure comprising a separator in which a gas manifold and gas passage section are formed, seal sheet which seals the separator periphery and gas diffusion layer which is placed in such a way to come into contact with the seal sheet, wherein the manifold and diffusion layer can be in communication with each other via slit spaces in a comb teeth structure formed to be connected to the diffusion layer.

13. The separator structure according to Claim 12,

wherein said periphery, on which said seal sheet is placed, is preferably 1 mm thick or less.

14. The separator structure according to Claim 12, wherein said comb teeth structure is positioned on the extension of said gas passage section.

15. The separator structure according to Claim 12, wherein said slit spaces in said comb teeth are arranged at a pitch of 0.8 to 2.5 mm.

16. The separator structure according to Claim 12, wherein void fraction of said diffusion layer having said comb teeth structure is set at 50 to 90% when no load is applied.